Claims

1. A method of controlling bandwidth usage in a packet-switched network comprising:-

    (a) measuring overall network performance to calculate a plurality of metrics representative of bandwidth usage in the core network,

    (b) predetermining a guaranteed bandwidth value for a network user which is representative of a guaranteed bandwidth usage level,

    (c) receiving data at a network ingress and monitoring bandwidth usage of the network user at the network ingress to determine the bandwidth usage of the user in relation to the respective guaranteed bandwidth value,

    (d) deciding whether to pass packets into the network for the user which represent bandwidth which does not exceeded its guaranteed bandwidth usage, and

    (e) deciding whether to pass any excess packets which represent bandwidth usage in excess of the user's guaranteed bandwidth, into the network based on at least one of the said metrics.

2. A method according to claim 1, wherein the overall network performance is measured by monitoring traffic flowing through at least one core router in the packet switched network.

3. A method according to claim 1, wherein the metrics include a measure of central tendency and a measure of dispersion.

4. A method according to claim 3, wherein the measure of central tendency is used to derive an n-price for average bandwidth traffic which is fed back to the ingress and used in conjunction with a respective average willingness-to-pay parameter associated with each user, to decide whether to pass data corresponding to the guaranteed bandwidth for each user into the network.

5. A method according to claim 3, wherein the measure of dispersion is used to derive an n-price for burst traffic which is fed back to the ingress and used in conjunction with a respective burst willingness-to-pay parameter associated

with each user, to decide whether to pass excess packets for each user into the
network.

6.   An edge-based node for a packet switched network comprising:-

     (a)   an ingress arranged to receive data from a plurality of users,

     (b)   an egress arranged to feed data into a packet switched network,

     (c)   a metrics input arranged to receive a plurality of metrics representing a
           plurality of statistical measurements of bandwidth usage in the core
           network, and

     (d)   a resource processor arranged to control the flow of data from the
           ingress to the egress,

     the resource processor being operable to receive data from the ingress and to
     monitor the bandwidth usage of a plurality of network users connected to the
     ingress to determine the bandwidth usage of each user in relation to respective
     guaranteed bandwidth values associated with each user, the resource controller
     being further operable to decide whether to pass packets to the egress for each
     user which has not exceeded its guaranteed bandwidth usage, and to decide
     whether to pass any excess packets which represent bandwidth usage in
     excess of a user's guaranteed bandwidth, to the egress based on at least one
     of the said metrics.

7.   A node according to claim 6, wherein the resource processor is operable to
     derive an n-price for average bandwidth traffic, wherein each user has an
     associated willingness-to-pay value for the transmission of its guaranteed
     bandwidth and wherein the resource processor is further operable to decide
     whether to pass packets to the egress for each user which has not exceeded its
     guaranteed bandwidth usage based on a comparison of the average bandwidth
     traffic n-price and each users' guaranteed bandwidth willingness-to-pay value.

8.   A node according to claim 6, wherein the resource processor is operable to
     derive an n-price for burst traffic, wherein each user has an associated
     willingness-to-pay value for the transmission of any excess packets which
     represent bandwidth usage in excess of a user's guaranteed bandwidth, and
     wherein the resource processor is further operable to decide whether to excess

pass packets to the egress which represent bandwidth usage in excess of a user's guaranteed bandwidth, based on a comparison of the burst traffic n-price and each users' excess packets willingness-to-pay value.

9. Software which when executed on suitable hardware operates to control bandwidth usage in a packet-switched network by causing the hardware to:-

   (a) measure overall network performance to calculate a plurality of metrics representative of bandwidth usage in the core network,

   (b) predetermine a guaranteed bandwidth value for each user which is representative of a guaranteed bandwidth usage level,

   (c) receive data at a network ingress and monitoring bandwidth usage of a plurality of network users at the network ingress to determine the bandwidth usage of each user in relation to the respective guaranteed bandwidth values,

   (d) decide whether to pass packets into the network for each user which has not exceeded its guaranteed bandwidth usage, and

   (e) decide whether to pass any excess packets which represent bandwidth usage in excess of a user's guaranteed bandwidth, into the network based on at least one of the said metrics.

10. A packet-switched network including an edge-based node, the node comprising:-

   (a) an ingress arranged to receive data from a plurality of users,

   (b) an egress arranged to feed data into a packet switched network,

   (c) a metrics input arranged to receive a plurality of metrics representing a plurality of statistical measurements of bandwidth usage in the core network, and

   (d) a resource processor arranged to control the flow of data from the ingress to the egress,

the resource processor being operable to receive data from the ingress and to monitor the bandwidth usage of a plurality of network users connected to the ingress to determine the bandwidth usage of each user in relation to respective guaranteed bandwidth values associated with each user, the resource controller being further operable to decide whether to pass packets to the egress for each user which has not exceeded its guaranteed bandwidth usage, and to decide

whether to pass any excess packets which represent bandwidth usage in excess of a user's guaranteed bandwidth, to the egress based on at least one of the said metrics.

5   11.   A network according to claim 10, including a node in the core network operable to measure bandwidth usage and produce data processable to produce a metric for input to the metrics input.

     12.   A network according to claim 10, wherein the network is an optical network
10   having nodes in the network core which are photonic nodes.

     13.   A network according to claim 12, wherein routing in the core network is carried out in the optical domain.

15   14.   A network according to claim 10, wherein queuing of packets occurs only in edge-based network nodes.

     15.   A network according to claim 10, wherein dropping of packets occurs only in edge-based network nodes.

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